REMARKS

Claims 1, 3, and 8-13 remain in this application, with original Claims 2 and 4-7 previously cancelled. Applicant respectfully requests reconsideration and review of the application in light of the following remarks.

Before addressing the merits of the grounds of rejection, Applicant provides the following brief description of the invention. The claimed invention generally relates to methods and systems for reducing peak-to-average power ratio (PAPR) in telecommunication systems. The invention provides a frequency-domain *guard band* aided method that generally comprises (a) detecting peaks in the modulated baseband signal that exceed a threshold, and generating a pulse sequence signal therefrom, and (b) applying a pulse sequence shaping to filter the pulse sequence signal for generating a peak-cancellation signal. Specifically, the reduced peak-to-average power ratio is achieved by limiting a pass-band of the pulse sequence shaping to a frequency-domain gap between the edge of the information-carrying bandwidth and the edge of the baseband, this gap being known as the *guard band* in the art. See page 15, line 21 - page 16, line 15 of Specification. The transfer function of the pulse shaping filter, shown in Fig. 5 of the present application, can be divided into three distinct regions:

1. The in-band region with the attenuation of A dB controls the in-band region emission and thus prevents in-band distortion.

2. The pass-band of the pulse shaping filter is accommodated by the guard band where the attention of the pulse shaping filter transfer function is set to zero dB (i.e., no attenuation).

3. In the frequency range beyond the edges of the channel's frequency band (defined by the FCC standards), the pulse shaping filter's transfer function exhibits attenuation of B dB to mitigate the out-of-band emission and thus prevent inter-channel interference.

Accordingly, an advantage of the claimed filtering method is that the majority of the PAPR-reducing signal's power spectral density (PSD) is concentrated in the guard band, which minimizes in-band distortion and facilitates PAPR reduction without

comprising information carrying bandwidth.

The Examiner rejected Claims 1 and 8 under 35 U.S.C. § 102(b) as being anticipated by Atwater et al. (U.S. Patent No. 6,175,551). With respect to independent Claim 1, the Examiner asserts that Atwater et al. disclose a method of reducing the peak-to-average power ratio of a modulated baseband signal, wherein the baseband signal is constituted by a waveform function modulated by information-carrying symbols transmitted in parallel, the method comprising the steps of:

- detecting peaks in the modulated baseband signal that exceed a threshold (peak detector 52 in Fig. 4; col. 4, lines 59-62), and generating a pulse sequence signal thereform (the output of peak detector 52; col. 4, lines 63-66); and
- applying a pulse sequence shaping to filter the pulse sequence signal (filter block 56) for generating a peak-cancellation signal (the output of filter block 56).

The Examiner concedes that the following limitation is not disclosed:

> wherein the pulse sequence shaping is designed such that its pass-band is limited to a frequency-domain gap between the edge of an information-carrying frequency bandwidth of the modulated baseband signal and an edge of a frequency band for the baseband signal defined by a spectral mask specifying a maximum tolerable out-of-band emission.

The Examiner states, however, that the pass-band of the pulse shaping filter defined by the edges of the information-carrying frequency and a spectral mask is merely a filter.

Applicant traverses this rejection and the Examiner's characterization of the Atwater et al. reference. Claim 1 recites not merely a generic filtering method, as appears to be the interpretation of the Examiner; rather Claim 1 recites a specific type of filtering that is not disclosed by Atwater et al. or the prior art of record. Atwater et al. disclose a means for reducing the peak-to-average power ratio by using peak cancellation. Atwater et al. disclose that an efficient way to generate the necessary

cancellation signal from the peak detection signal is achieved with a low-pass filter in the frequency domain (block 56 in Fig. 4). However, Atwater et al. do not disclose the claimed method of filtering, whereby the pass-band of the low-pass filter is specially shaped so that its pass-band (and hence the majority of its PSD) is accommodated in the frequency-domain gap between the edge of the information-carrying bandwidth and the edge of the baseband. Nothing in Atwater or the prior art of record teaches or suggests pulse sequence shaping wherein "its pass-band is limited to a frequency-domain gap between the edge of an information-carrying frequency bandwidth of the modulated baseband signal and an edge of a frequency band for the baseband signal defined by a spectral mask specifying a maximum tolerable out-of-band emission," as recited in Claim 1.

The Examiner rejected Claims 3 and 9 under 35 U.S.C. § 103(a) as being unpatentable over Atwater et al. (U.S. Patent No. 6,175,551) in view of Wu et al. (U.S. Patent Application Publication No. 2002/0172146). However, Claims 3, 8, and 9, which depend from Claim 1, are deemed patentable for the same reasons stated above with respect to Claim 1, and because of the additional limitations set forth therein. Accordingly, Applicant requests that the rejection of Claims 1, 3, 8, and 9 be withdrawn.

The Examiner rejected Claims 10-13 under 35 U.S.C. § 103(a) as being unpatentable over Atwater et al. (U.S. Patent No. 6,175,551) in view of Vannatta et al. (U.S. Patent No. 5,930,299). With respect to independent Claim 10, the Examiner asserts that Atwater et al. disclose a transmitter comprising:

- a baseband signal generator operable to generate a digital baseband signal from an input data stream (coding block 24; col. 3, lines 56-60);
- a digital-to-analog converter operable to convert the digital baseband signal into an analog baseband signal prior to output by a transmitter stage (digital-to-analog converter 35 prior to transmission block 38);
- a signal divider for splitting the oversampled digital baseband signal into first and second parts (the output of IFFT 28);
- a peak detector arranged to receive the first part of the oversampled digital baseband signal as input (peak detector 52) and operable to

output a pulse sequence signal containing a pulse for each peak in the oversampled digital baseband signal that exceeds a threshold level (col. 4, lines 61-66);

- a pulse shaping filter operable to receive the pulse sequence signal (filter block 56) and covert it into a filtered clipping signal (the output of filter block 56); and
- a signal combiner (adder 64) operable to substract the filtered clipping signal from the second part of the oversampled digital baseband signal (col. 5, lines 6-8) so as to produce a digital baseband signal with reduced PAPR for input to the digital-to-analog converter (col. 1, line 67 - col. 2, line 6).

The Examiner concedes that Atwater et al. fail to teach an oversampling filter arranged between the baseband signal generator and digital-to-analog coverter operable to oversample the digital baseband signal to generate an oversampled digital baseband signal. The Examiner states, however, that Vannatta et al. teach a transmitter with an oversampling filter (FIR filter 164 in Fig. 1; col. 3, lines 9-15) arranged between the baseband signal generator (encoder 120) and digital-to-analog converter (DAC 168). According to the Examiner, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the filter of Vannatta et al. into the transmitter of Atwater et al., and thereby reduce the peak-to-average power ratio of a modulated signal to allow an increase in power amplifier efficiency (col. 2, lines 14-15; col. 2, lines 25-28).

Applicant traverses this rejection and the Examiner's characterization of the cited references. The Examiner apparently cited Vannatta et al. since it discloses a transmitter with an oversampling filter (FIR filter) arranged between the baseband signal generator and the digital-to-analog converter. However, Applicant's explanation with respect to independent Claim 1 also applies to independent Claim 10, which is patentable by virtue of the specific type of pulse shaping filter recited in Claim 10. Specifically, the prior art of record fails to disclose a pass-band of the low-pass filter that is specially shaped so that its pass-band (and hence the majority of its PSD) is

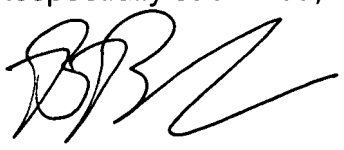
accommodated "between an edge of an information-carrying frequency bandwidth of the modulated baseband signal and an edge of a frequency band for the baseband signal defined by a spectral mask specifying a maximum tolerable out-of-band emission," as recited in Claim 10.

Claims 11-13 which depend from Claim 10, are deemed patentable for the same reasons stated above with respect to Claim 10, and because of the additional limitations set forth therein. Accordingly, Applicant requests that the rejection of Claims 10-13 be withdrawn.

In view of the foregoing, the Applicant respectfully submits that Claims 1, 3, and 8-13 are in condition for allowance. A timely Notice of Allowance is solicited. If it would be helpful to placing this application in condition for allowance, the Applicant encourages the Examiner to contact the undersigned counsel and conduct a telephonic interview.

While the Applicant believes that no fees are due in connection with the filing of this paper, the Commissioner is authorized to charge any shortage in the fees, including extension of time fees, to Deposit Account No. 50-0639.

Respectfully submitted,



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